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# Specific Features of ADHD Syndrome at Preschool Age

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**Abstract**

The aim of this article was to compare the syndrome of ADHD in preschool and primary school age. The main task was to show that hyperactive children without neuropsychological remediation reveal an increasing of mental defects with age. It proves the importance of a timely neuropsychological assistance for the early remediation of children.



*Key words*: neuropsychology; ADHD; preschool age, neuropsychological remediation.

## Problem

Attention deficit and hyperactivity disorder (ADHD) is a frequent reason for asking a psychological help in childhood. ADHD is one of the most common behavioral disorders among children. According to criteria DSM-IV the frequency of ADHD varies from 3 to 20% [1], the official indicator in the DSM-IV being 3-5%. It means that at least every thirtieth child has ADHD, and it really means that each class of a primary school has at least one such student.

At the behavioral level, this disorder is manifested primarily by excessive and not justified physical activity, fussiness and impulsivity, exceeding the limits of age standards, as well as the difficulties of concentration of attention due to frequent switches of attention. Neuropsychological assessment identifies these children immaturity of various cognitive functions [2; 3].

The disorder typically occurs early in the development process, usually within the first 5 years of life. However, the peak of applications to specialists is by six or seven years of age, when excessive, poorly organized and poorly regulated activity of a child becomes an obstacle for the beginning training activities. Even with relatively high intellectual potential the children with ADHD are often unsuccessful at school and are experiencing difficulties in social adaptation to peers [4].

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Unfortunately, despite the frequency of the syndrome, this disorder is often revealed late, incorrect or not detected, the behavior of the child is explained by a lack of a due upbringing from the parents or by a bad character of the child, which cannot be changed. Accordingly, most children do not receive timely and necessary support.

Analysis of the corresponding literature has shown that in most studies the observations were carried out for children of school age. It's a period when the signs are manifested more clearly. Mechanisms of development and manifestation of ADHD in early and pre-school age remain largely out of attentiont of psychologists.

That is why a study of children with specific needs and deficits of mental functions development has a great importance for psychological and pedagogical practice in pre-school age. Early diagnosis and remediation should be aimed at the pre-school age, when compensative abilities of the brain are great, and still are able to prevent the persistent abnormal manifestations [5; 6; 7].

This was the subject of our study.

**Methods**

In our study, we used the following methods:

- Conners Scale to determine the level of ADHD - questionnaire containing 10 (short variant) or 80 (full version) questions, which assesses behavior of the child. In our study, parents of preschoolers were proposed short version of the questionnaire, while parents of primary school students filled out the full version.
- Methods of Lurian neuropsychological examination, adapted to the children population, with quantitative and qualitative evaluation of results. These methods allows us to differentiate difficulties in learning and behavior, due to an underdevelopment or individual peculiarities of functioning of brain structures (J.M. Glozman, 2009).
- Analysis of the early development of the child through a special questionnaire for parents.

**Subjects**

9 preschool children with ADHD, confirmed at a neurological assessment and by Conners Scale data (score exceeding 15 on Conners Scale-10) participated in the study. Between them there were 7 boys and 2 girls aged 3 to 6 years. All 9 preschoolers followed a course of neuropsychological remediation in the Moscow Research Centre of Developmental Neuropsychology, after which a control neuropsychological assessment was done to reveal a dynamics of results after remediation.

Besides the sample included 13 schoolchildren with a diagnosis of ADHD, confirmed at a neurological assessment and by Conners Scale-80 data. There were 11 boys and 2 girls aged from 7 to 11 years.

**Comparative analysis of the neuropsychological data in preschool and school children before remediation.**

We compared preschoolers and schoolchildren on data of Lurian neuropsychological assessment before remediation.

It was revealed that schoolchildren without remediation at the pre-school period show minimal positive dynamics in gnostic and mnestic functions that can be associated with the growing up of children, while the average data remain unchanged.

At the same time in many mental spheres there were symptoms of deterioration, such as orientation of children in time and what about, their general knowledge, the control of own behavior, critical attitude to the mistakes made and adequacy during the assessment. Also there was revealed an underdevelopment of verbal functions - expressive speech, naming, understanding of logical and grammatical structures. However, the most negative changes were observed in neurodynamic signs of children. For various reasons in children the level of functional brain activity is unstable, has poor resistance to loads, requires to provoke constant stimulation and periods of productive work are alternated by rest. So it is more than expected that the working capacity of pupils worsen with ever-increasing loads at school from year to year (fig.1).

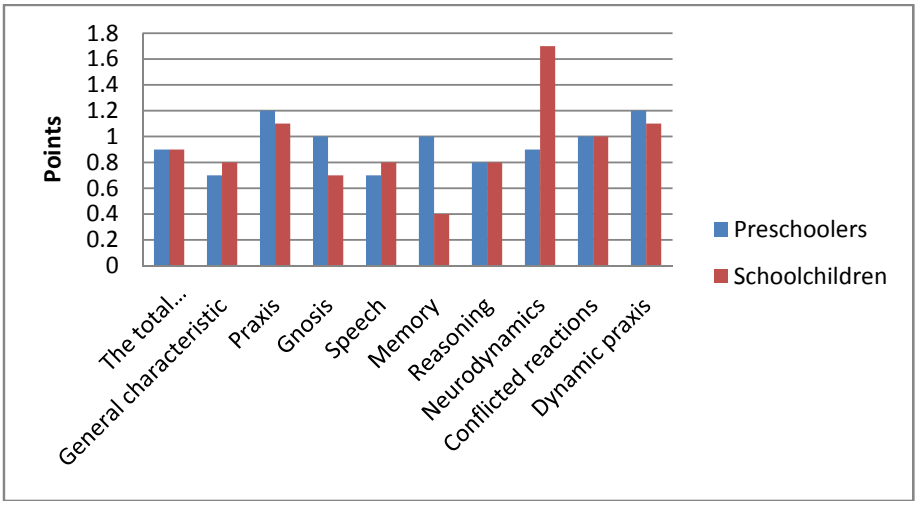


Fig. 1. A comparative pattern of neuropsychological assessment data in preschool and school children before remediation

In addition to the quantitative analysis of scores of neuropsychological assessment for both groups of children we did a comparative qualitative evaluation of defects of higher mental functions in preschoolers and schoolchildren. The results are presented on the figure 2. One can see an increase in the number of defects in the areas of speech, memory and neurodynamics among pupils compared with preschool children.

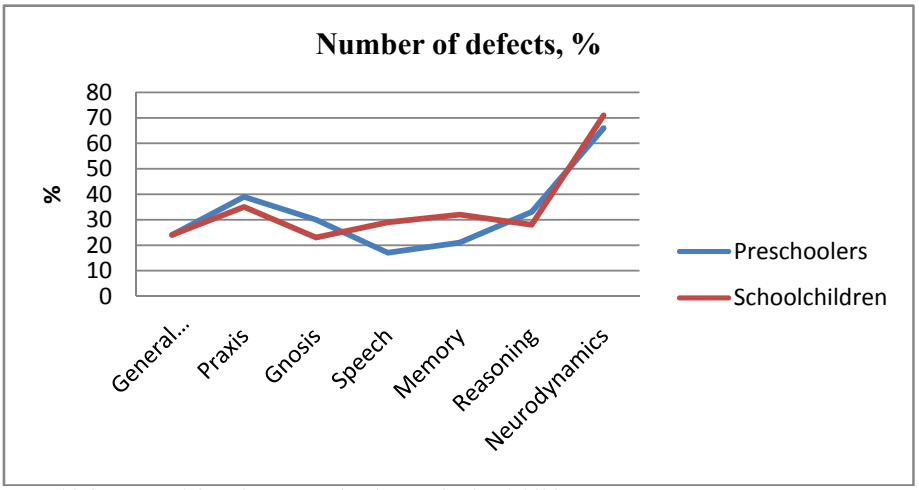


Fig. 2. Defects og higher mental functions preschoolers and schoolchildren

Spearman rank correlation showed that the age of the child has a significant correlation with neurodynamic indicators, impaired memory and the ability to solve problems. It means that more old is the child, worse (without remediation) are scores for neurodynamics, defects of memory and for solving problems.

Hyperactivity, or an excessive motor disinhibition, is a manifestation of fatigue. A tired child, not alike an adult, cannot control the condition and take time to rest. It is manifested in an overdrive (chaotic subcortical

excitation). As a consequence, children have highlights of specific changes in the neurodynamic nervous processes.

The mental process in children also manifest apparent weakness in the formation of the unit of brain activation. The defects of neurodynamic bases of mental functions lead to the evidence that even with a sufficient ability of memorization the acqired information rests unstable, rapidly disappearing (inhibited) by interfering influences, especially homogeneous [2].

The solution of problems needs planning, execution procedure, to achieve the results. An hyperactivity disorder includes an immaturity of planning and control even own movements (not to mention the higher levels), such a complex multi-level action, as a solution of problems causes great difficulties for children with ADHD.

Significant correlations were found between children with ambidexterity and the severity of defects of intelligence, which indicates the need for a special approach to the formation of intellectual functions in children with incomplete dominance of the left hemisphere.

**The relationship between the peculiarities of pregnancy, birth, early child development and mental development of the child.**

The recent studies reveal many factors, which can lead to appearence of ADHD. That is why actually a multycausal theory of ADHD development is predominant. The biological factors, especially perinatal hypoxic lesions of central nervous system, are the most important in the first two years of life. In the later development the disorders also depend on psychological and social factors such as family situation, upbringing methods, financial and social situation [8].

The causes of observed symptoms were revealed in our study through the analysis of data of the checklist of early child development.

Significant correlations were found between birth pathology and quantitative scores for praxis. More noticeable was birth pathology (cord entanglement, asphyxia, hypoxia, hypotrophy and so on) greater were disorders of motor coordination, fine motor skills and praxis.

Significant correlations were found between abnormal children's motor development during the first year of life and quantitative evaluation of preschooler's speech development and speech defects.

Study of children with speech pathology shows that they had motor development problems since very early age. These children don't have any neuromotor symptoms (hyperkinesises, paresises) but they began to maintain head, to seat, to stand later than it prescribed by the age-related norms. They have formed later locomotor functions (climbing, walking, jumps).

The psychomotor defects of the most children with speech pathology prove an interrelation and interdependence between speech and motor development. It is also indicates a functional unity of speech (not only in its motor component) and of motor systems in the process of their formation in child's ontogenesis. It has been proofed that a stimulation of fingers movements affects the central nervous system maturation [9]. A timely speech development is one of these displays.

Defects of speech in children with motor underdevelopment, an importance of motor system in child's neuromental development prove the need for special complex neuropsychological remediation for all components of children's motor development. Significant correlations were found between child's motor retardation and gnostic defects, because active hands movements (crawl, toy's grip) stimulate the formation of steady objects images and of orientation in space. As shown above [2; 10] the spatial defects observed in most children with ADHD are exacerbated in school age (Fig.3).

Perseverations and not coordinated movements are observed, together with difficulties to follow program in the dynamic praxis and an immaturity of spatial functions in praxis and drawing.

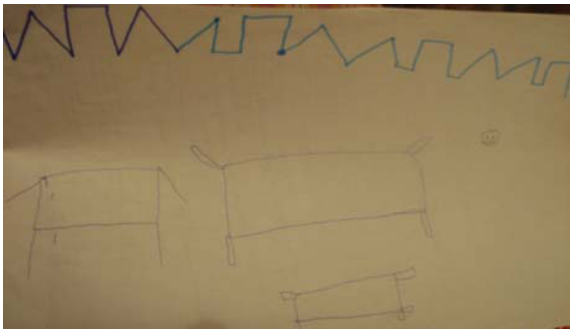

Fig.3. Example of dynamic praxis graphic test and drawings of table, made by 11-year-old schoolboy with ADHD.

**Remediation of ADHD.**

Even psychiatrists say that the drugs do not solve the whole spectrum of problems of ADHD: because the problems of development of higher mental functions cannot be overcome with the medicines. [11].

The follow-up of children with ADHD have proved the importance of a comprehensive program of motor and cognitive remediation of children with this syndrome.

Development of voluntary regulation, orientation and control of own activities is the central focus of neuropsychological remediation of hyperactive children with attention deficit. Method of remediation is based on two main approaches: overcoming neurodynamic problems through a "saturation of the child by activity" and using of external supports for mediation of regulatory functions [2; 10].

**Dynamics of child mental functioning after neuropsychological remediation in preschoolers.**

In our study, all preschoolers followed a course of neuropsychological remediation. At the end of the course, a control neuropsychological assessment was done, which showed a positive dynamics (reduction of the penalty points) in all spheres of the development of the child.

The most significant changes according to the T-test Wilcoxon were noted in the scoring of praxis (p=0.008), gnosis (p=0.018), memory (p=0.012) and intelligence (p=0.018), as well as in conditioned reactions (p=0.043) (fig.4).

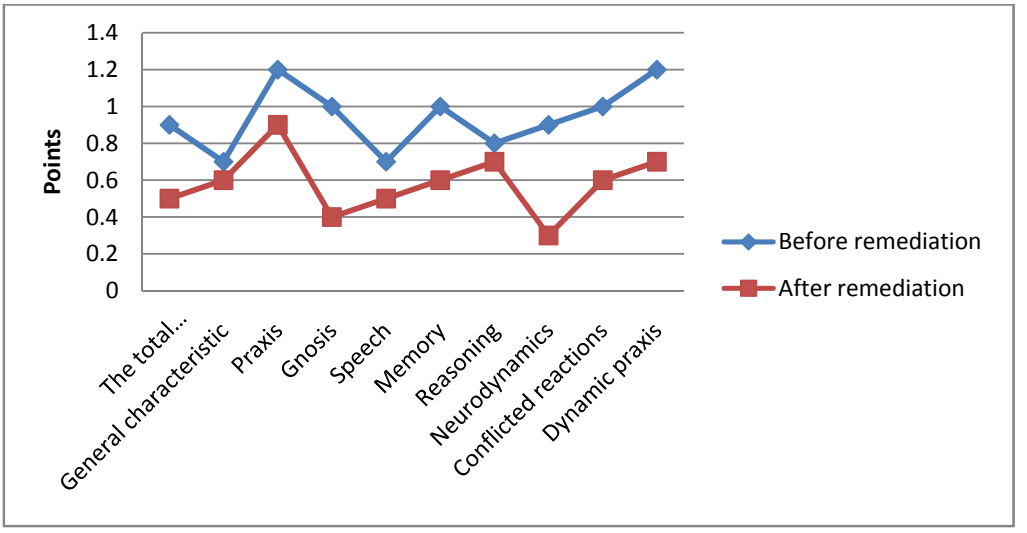

Fig.4. Dynamics of preschoolers scores after remidation

Furthermore, statistically significant improvements was observed in the total neuropsychological score (the average of all spheres of the child assessment). It indicates, first the importance of a comprehensive approach to the neuropsychological remediation of children (instead of the development of a separate sphere), and, secondly, the importance of the remediation effectuated at the preschool age, when there is still time before scholarship and a comprehensive development of all higher psychic functions in a preschooler will help him to be more successful in learning activities.

The following examples illustrate the development of spatial organization of movements and actions in a 4-year-old preschool child. Significant results appeared already after a course of 20 remediation sessions (fig.5).

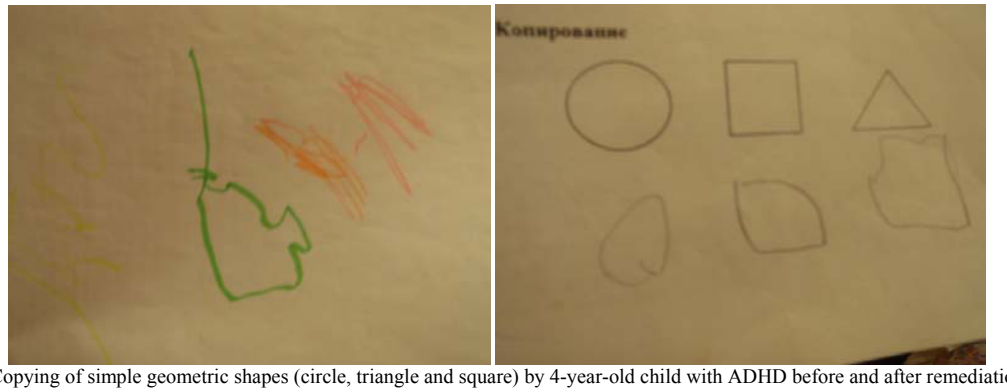


Figure 5. Copying of simple geometric shapes (circle, triangle and square) by 4-year-old child with ADHD before and after remediation.

**Conclusion**

Neuropsychological assessment of children after a remediation course shows that the used methods are effective both for overcoming the problems in learning, and for the reduction of the symptoms of ADHD [10].

Thus, comparing syndrome of ADHD in preschool and primary school children, estimating the dynamics of child mental functioning after neuropsychological remediation in preschoolers, we can indicate the importance of diagnosing and remediating the syndrome of ADHD in the early preschool age. And the sooner a preschooler will receive a comprehensive neuropsychological help, the easier will be the learning process in school.

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